

Standard Operating Procedure for Niskin Bottle Hydrographic Line Sampling

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1.0 NISKIN BOTTLE HYDROGRAPHIC LINE SAMPLING

1.1 Niskin Bottle

- 1.1.1 The Niskin bottle is a plastic cylinder with stoppers at each end, connected by an elastic cord. The stoppers are held open by plastic cords attached to a release mechanism. Two clamps on the side of the cylinder are used to attach the bottle to a hydrographic line (usually a 3/16-inch steel cable with a 10-lb weight at the end) so that it can be lowered to a discreet depth in the water. When a small weight encircling the hydrographic line is released down the line, it strikes the release mechanism resulting in the two stoppers being pulled into the ends of the cylinder, thereby trapping water from that depth. The release mechanism also has the facility for holding a second messenger on the hydrographic line below the Niskin bottle such that when the mechanism is triggered, the second messenger is released down the line below the Niskin to trigger another Niskin further down the line. In this way several bottles can be triggered sequentially in one operation.

1.2 Niskin Bottle Sampling

- 1.2.1 The sampling operation is performed by two people; sampler A operates the winch and possibly helps loading the Niskin bottles on the line, sampler B loads the bottles on the line, dispatches the messenger, discharges the Niskin contents into the appropriate sample storage containers, and determines the temperature of the surface sample by inserting a thermometer into the top while the top stopper is pulled aside. This temperature measurement must be made as soon as possible after the surface Niskin is retrieved. If phosphorus samples are taken, clean plastic gloves are worn during the bottling to preclude contaminating the samples with the hands.
- 1.2.2 If an EBT has been used to determine the thermal structure of the water column, the bottom minus one meter (or the B-2 depending on the lake) sampler is loaded onto the line just above the bottom weight after which the metering sheave is set to the depth of the B-1 sample. The sheave must be configured such that as the line deploys, the sheave reading decreases. The line is deployed until the sheave reading corresponds to the next sampling depth, and another Niskin bottle is attached to the line along with a messenger. This sequence continues until the one meter sample is attached corresponding to a sheave reading of one meter. The line is then deployed until the one meter sample is about a meter below the surface. A messenger then is attached to and deployed down the line to sequentially trigger all the bottles. By placing ones fingers on the line, one can feel a pulse as each of the bottles is triggered. When all of the bottles have been triggered, the bottles are retrieved and the contents transferred to sample storage bottles (one gallon cubitainers for chemical and physical parameters except that chlorophyll *a* samples are collected in brown one liter plastic bottles). Each of the sample storage bottles is rinsed with a small quantity (about 10% of the bottle volume) of sample prior to filling.

- 1.2.3 Composite “integrated” samples are amassed by loading a rinsed cubitainer with equal volumes of sample from different depths. A one liter sample storage bottle for phytoplankton is rinsed with sample from one of the euphotic depths prior to compositing an equal volume from each of them for the Integrated sample. See *Field Sampling Using the Rosette Sampler*.

2.0 SAFETY AND WASTE HANDLING

- 2.1 Refer to GLNPO’s *Health, Safety and Environmental Compliance Manual* (May 1997, or as amended) and individual instrument procedural operations manuals for specific details on applicable 1) personal health and safety issues; 2) instrumental, chemical, and waste handling procedures and; 3) accident prevention. This applies to all EPA personnel, EPA contractors or federal, state, or local government agencies, and persons who operate or are passengers onboard US EPA GLNPO vessels during all activities and surveys.
- 2.2 All applicable safety and waste handling rules are to be followed. These include proper labeling and disposal of chemical wastes. Over-board discharges of chemical wastes are forbidden.
- 2.3 During sampling, caution, common sense, and good judgement should dictate appropriate safety gear to be worn in any given situation on deck. Hardhats, gloves, and steel-toed shoes must be worn in working conditions where there is a possibility of injury to the head, hands, or feet; however, if in doubt, please ask the Chemical Hygiene Officer.
- 2.4 Collecting samples in cold weather, especially around cold water bodies, carries the risk of hypothermia and frostbite. Sampling team members should wear adequate clothing for protection in cold weather. For specific information regarding sampling during cold conditions, please refer to the US EPA GLNPO *Standard Operating Procedures for Winter Operations* (December 1994, or as amended).
- 2.5 Collecting samples in extremely hot and humid weather carries the risk of dehydration and heat stroke. Sampling team members should carry an adequate supply of water or other liquids for protection against dehydration in hot weather.
- 2.6 Work vests must be worn while working on the fantail and Rosette deck.